

A new species of *Colossendeis* (Pycnogonida: Colossendeidae) together with records from Australian and New Zealand waters

DAVID A. STAPLES

Museum Victoria, GPO Box 666, Melbourne, Victoria 3001 Australia (dstaples@museum.vic.gov.au)

Abstract

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Six species of the genus *Colossendeis* Jarzynsky, 1870 and one species of *Hedgpethia* Turpaeva, 1973 are reported from Australian and New Zealand waters; namely *Colossendeis arcuata* Milne-Edwards, 1885, *C. colossea* Wilson, 1881, *C. tasmanica* sp. nov., *C. melancholicus* Stock, 1975, *C. spicula* Child, 1994, *C. mycterismos* Bamber, 2004 and *Hedgpethia dampieri* (Child, 1975). *Colossendeis melancholicus*, *C. spicula* and *C. mycterismos* are recorded from the region for the first time. Diagnoses for each species are provided. Type specimens of *Hedgpethia dampieri* have been re-examined.

Keywords

Pycnogonida, southern Australia, north-west Australia, New Zealand, Colossendeidae, *Colossendeis*, *Hedgpethia*, deep-sea, Tasman Sea, NORFANZ.

Introduction

This paper reports on pycnogonid material belonging to the family Colossendeidae collected from Australian and New Zealand waters, between approximate latitudes of 21°S and 55°S. Although not represented in the collection sites, New Caledonia partly falls within these latitudes and three species from that area are also included. Two genera belonging to this family are represented in this report; *Colossendeis* Jarzynsky, 1870 and *Hedgpethia* Turpaeva, 1973. *Colossendeis* is typically a deep-sea genus that includes the largest pycnogonids, commonly with far-ranging distributions. Because of their size, frequently with leg spans ranging from 40–50 cm, *Colossendeis* is the most conspicuous genus represented in deep-sea trawls. *Colossendeis* was first recorded from the Australian region by Hoek (1881) from *Challenger* station 158 (latitude about 50° S). Clark (1963) and Child (1995) subsequently recorded specimens from the Great Australian Bight, Western Australia and from south of Tasmania respectively. Child (1998) provided an excellent review of the pycnogonid fauna of New Zealand between approximate latitudes of 25°S to 55°S. He documented nine species of *Colossendeis* and described one new species of *Hedgpethia* but appears to have overlooked Fage's (1956) report on the pycnogonids collected by the *Galathea* expedition in which five species of *Colossendeis* from New Zealand waters were recorded. The number of specimens available for study has increased substantially in recent years, reflecting the increased activity in deep-sea research in the region. This report records a further four species of which one is new and three represent

new records. A large number of specimens collectively grouped under the *macerrima* complex of species (Stock, 1978), will be the subject of a separate paper. Deep-sea observations of a *Colossendeis* swimming off the bottom (Grassle et al., 1975), another floating near the bottom (Monod, 1954) and records from bathypelagic samples (Bamber, 2002; Mauchline, 1984) support the probability that distribution of some species is assisted by slow-moving currents found at these depths.

Unlike *Colossendeis*, which may be collected in large numbers, *Hedgpethia* species are usually represented by one or two species from few collecting sites. *Hedgpethia* does not reach the great size of most *Colossendeis*, and although they share a wide depth range, they generally extend into much shallower depths. Three species of *Hedgpethia* are represented from Australia, New Zealand and New Caledonia. This collection is predominantly based on sampling by the Australian Commonwealth Science and Industry Research Organization (CSIRO) vessels RV *Franklin* and RV *Southern Surveyor* from localities in the Tasman Sea, off the New South Wales and Victorian coasts, the east and west coasts of Tasmania, off the South Australian coast and the south and north west Western Australian coast. Specimens were recorded between latitudes 20°55.01'S and 41°54.54'S at depths ranging from 55 m to 2800 m. The NORFANZ voyage material is part of a larger collection by the New Zealand research vessel RV *Tangaroa* in a deep-sea trawling expedition around Norfolk I., Lord Howe I. and northern New Zealand from 10 May to 8 June 2003. The expedition documented the biodiversity of

the marine fauna from seamounts and slopes on the Norfolk Ridge and Lord Howe Rise. A brief diagnosis of species represented in this report together with additional figures, is provided to supplement existing descriptions. Specimens are lodged in the South Australian Museum (SAM); Australian Museum (AM); Museum Victoria (NMV); Tasmanian Museum and Art Galleries (TMAG) and Western Australia Museum (WAM). Duplicate NORFANZ specimens have been lodged in the National Museum of New Zealand, Te Papa (NMNZ).

Species of *Colossendeis* and *Hedgpethia* known from the Australian and New Zealand region

- Colossendeis angusta* Sars, 1877
Colossendeis arcuata Milne-Edwards, 1885
Colossendeis australis Hodgson, 1907
Colossendeis bruuni Fage, 1956
Colossendeis colossea Wilson, 1881
Colossendeis cucurbita Cole, 1909
Colossendeis drakei Calman, 1915
Colossendeis hoeki Gordon, 1944
Colossendeis longirostris Gordon, 1938
Colossendeis macerrima Wilson, 1881
Colossendeis media Hoek, 1881
Colossendeis megalonyx Hoek, 1881
Colossendeis melanocholicus Stock, 1975
Colossendeis minor Schimkewitsch, 1893
Colossendeis mycterismos Bamber, 2004
Colossendeis pipetta Stock, 1991
Colossendeis sinuosa, Stock, 1997
Colossendeis spicula Child, 1994
Colossendeis tasmanica sp. nov.
Colossendeis tortipalpis Gordon, 1932
Hedgpethia dampieri (Child, 1975)
Hedgpethia eleommata Child, 1998
Hedgpethia tibialis Stock, 1991:166

Colossendeidae Hoek, 1881

Diagnosis. Trunk and legs typically glabrous. Lateral processes short, either clearly separated or crowded. Proboscis long, typically longer than trunk. Chelifores present or absent in adults. Palps 10-segmented (one species with 9 segments), basal segments 1 and 2 very short. Ovigera 10-segmented, terminal claw strong, strigilis well-formed. Legs long, 4, 5 or 6 pairs, auxiliary claws absent.

Colossendeis Jarzysky, 1870

Diagnosis. Specimens often large; trunk unsegmented, smooth (very rarely with spines), tubercles or ridges absent; lateral processes usually clearly separated. Abdomen well-developed, usually articulated at base. Ocular tubercle low, rounded or

conical, sometimes terminally acute; 2–4 eyes present, or absent. Chelifores absent in adults. Palps and ovigera touching at bases; strigilis tightly curved, terminal claw strong. 4 pairs of legs, large propodal heel spines absent, main claw long or short, genital pores tiny. Sexual dimorphism little understood.

Remarks. Pale areas principally defined by a change of texture of the integument, are present on the dorsal surface of the 2nd coxa of all legs of most species. These areas are comprised of thinner cuticle and are either flat or blister-like (fig. 7B). Provisionally referred to as coxal glands (Staples, 2002: 541), the term coxal pellicula (= filmy protective covering) is now used to avoid implying a function and purpose which has not been established. Similar areas have also been noted in *Pentapycnon* (Bouvier, 1913) and *Pycnogonum* (Flynn, 1919). In some instances they resemble large genital pores and probably represent what Stiboy-Risch (1993) described and illustrated as dorsal genital openings in *C. glacialis* Hodgson, 1907, *C. arcuata* Stiboy-Risch, 1993 and *C. robusta* Hoek, 1881. As far as I am aware, the genital pores of all *Colossendeis* are placed ventrally on the 2nd coxae of some, or all legs. A single gland opening on the outer surface of palp segment 5 and the ecto-posterior surface of ovigera segment 4 is present in most species.

Colossendeis arcuata A. Milne-Edwards, 1885

Figures 1A–J, 7C, D.

Colossendeis arcuatus A. Milne-Edwards, in Filhol, 1885:151, fig. 48.

Colossendeis arcuata Stock, 1978: 403–405, fig. 1g–j [earlier synonymy]; Stock, 1986: 417–Bamber, 1983: 71–72, fig. 5; Bamber, 2004, 6–Child, 1992: 41; Child, 1998, 56–Bamber and Thurston, 1993: 859; Bamber and Thurston, 1995:143–45, fig. 9E.

Material examined. South Australia. Investigator Group, approx 75 n miles SSW of Pearson I., 35°08'S, 132°47'E, 1000 m, trawled, 1989, SAM E3383 (1 specimen). Approx 100 n miles SSE of Cape de Covedic, Kangaroo I., 37°S, 137°E, 900–1000 m, trawled, FV *Comet*, G. Newton, 14–8 Feb 1988, SAM E3384 (1 specimen). Approx. 120 n miles SW of Cape Adieu, Great Australian Bight, 33°58'S, 131°22'E, 1000 m, trawled, FV *Saxon Progress*, P. Wheenan, Nov 1989, SAM E3385 (1 specimen). Due SW of Kangaroo I., approx. 36°10'S, 135°45'E, 1060 m, 'orange roughly' trawl, G. Newton, July 1988, SAM E3387 (1 specimen). Western Australia. Approx. 11 n miles due S of Eucla, Great Australian Bight, 33°31'S, 128°49'E, 1059–1914 m, FV *Longva* 111, K. Gowlett-Holmes, 10 Dec 1989, SAM E3386 (1 specimen).

Diagnosis. A large, robust species. Trunk and proboscis covered in tiny but mostly inconspicuous, spinules. Ocular tubercle lowly conical in lateral view, two large eyes on the sloping anterior surface, unpigmented in preserved material. Proboscis 1.25–1.50 times length of the trunk, robust, down-curved throughout its length. Abdomen clavate, articulated with trunk. Palp segment 3 longest, segment 5 less than half length segment 3, distal segments characteristically doubly-recurved. Oviger claw linear, gently curved. Legs; tarsus about three-quarters length of propodus, claw less than one quarter propodus length.

Distribution. Cosmopolitan. Depth 730–2177 m.

Type locality. W of Moroccan Coast.

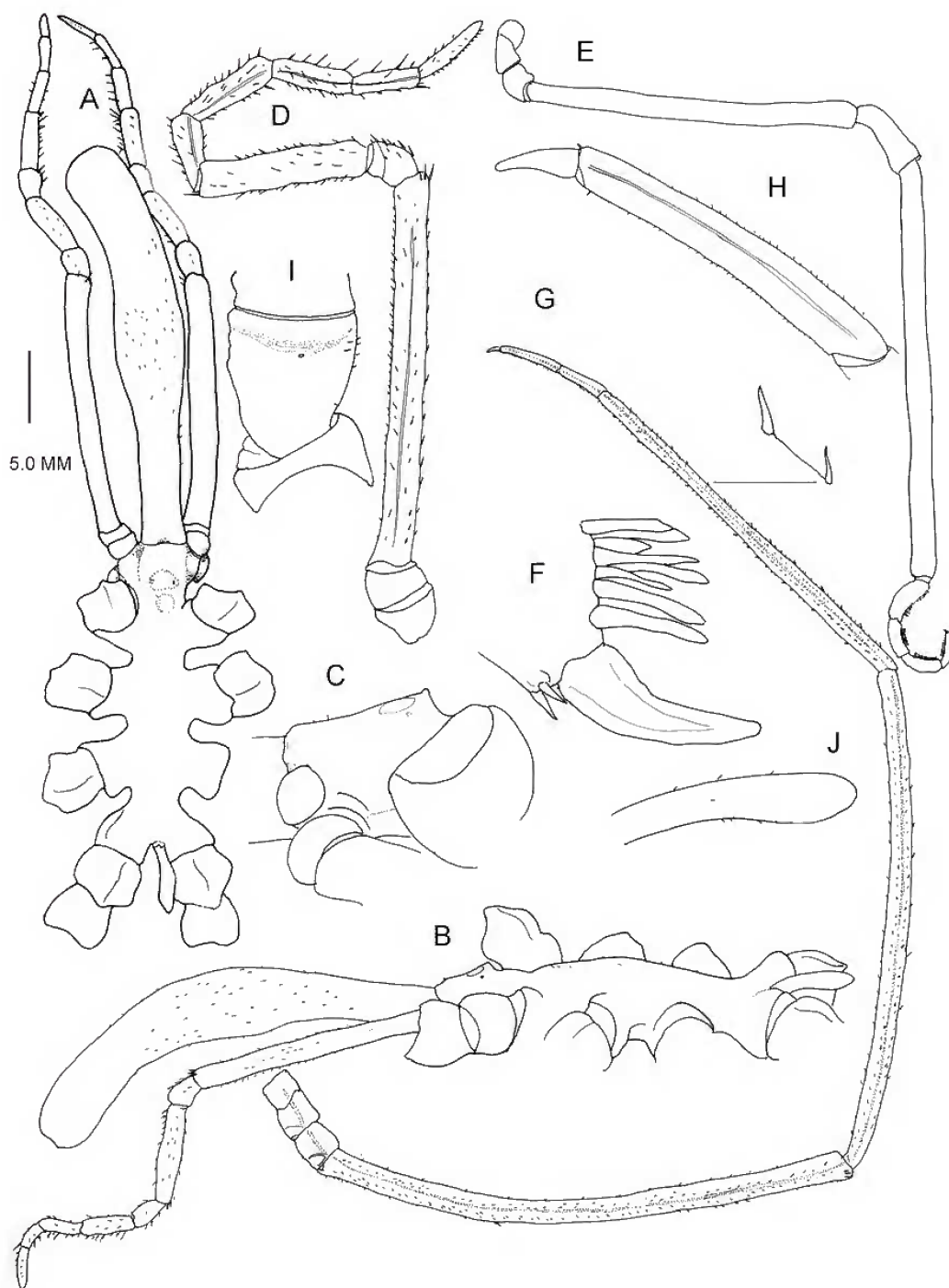


Figure 1. *Colossendeis arcuata* (SAM E3384): A, B, trunk, dorsal and ventral views of trunk; C, cephalon, lateral; D, palp; E, oviger; F, oviger claw; G, leg 3; H, propodus and claw; I, coxa 2 and genital pore; (SAM E3383); J, abdomen.

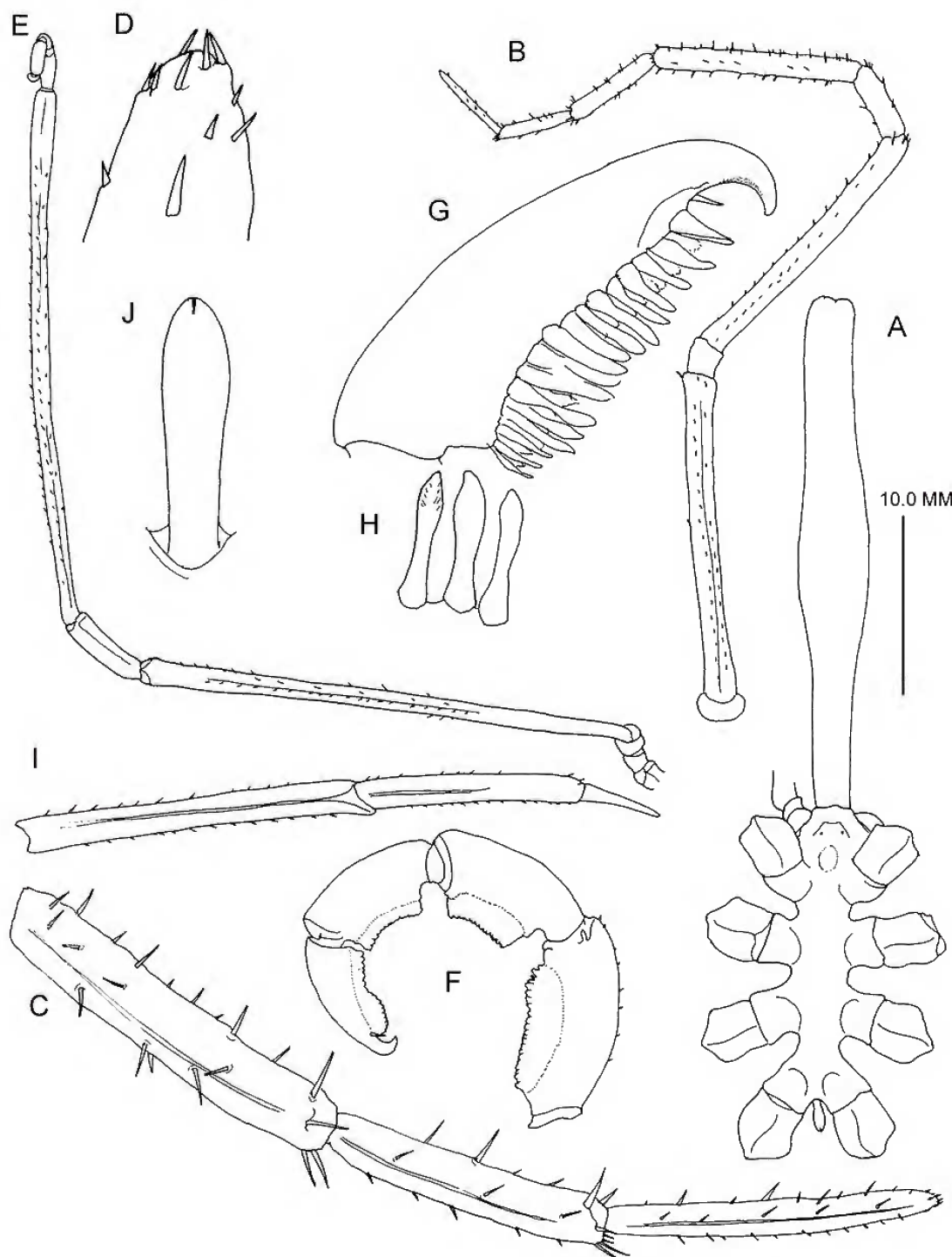


Figure 2. *Colossendeis colosseus* (NMV J40745): A, dorsal view of trunk; B, palp; C, palp segments 8 to 10; D, tip, palp segment 10; E, oviger; F, oviger segments 7–10; G, oviger segment 10; H, oviger spines; I, tarsus and propodus leg 3; J, abdomen, dorsal.

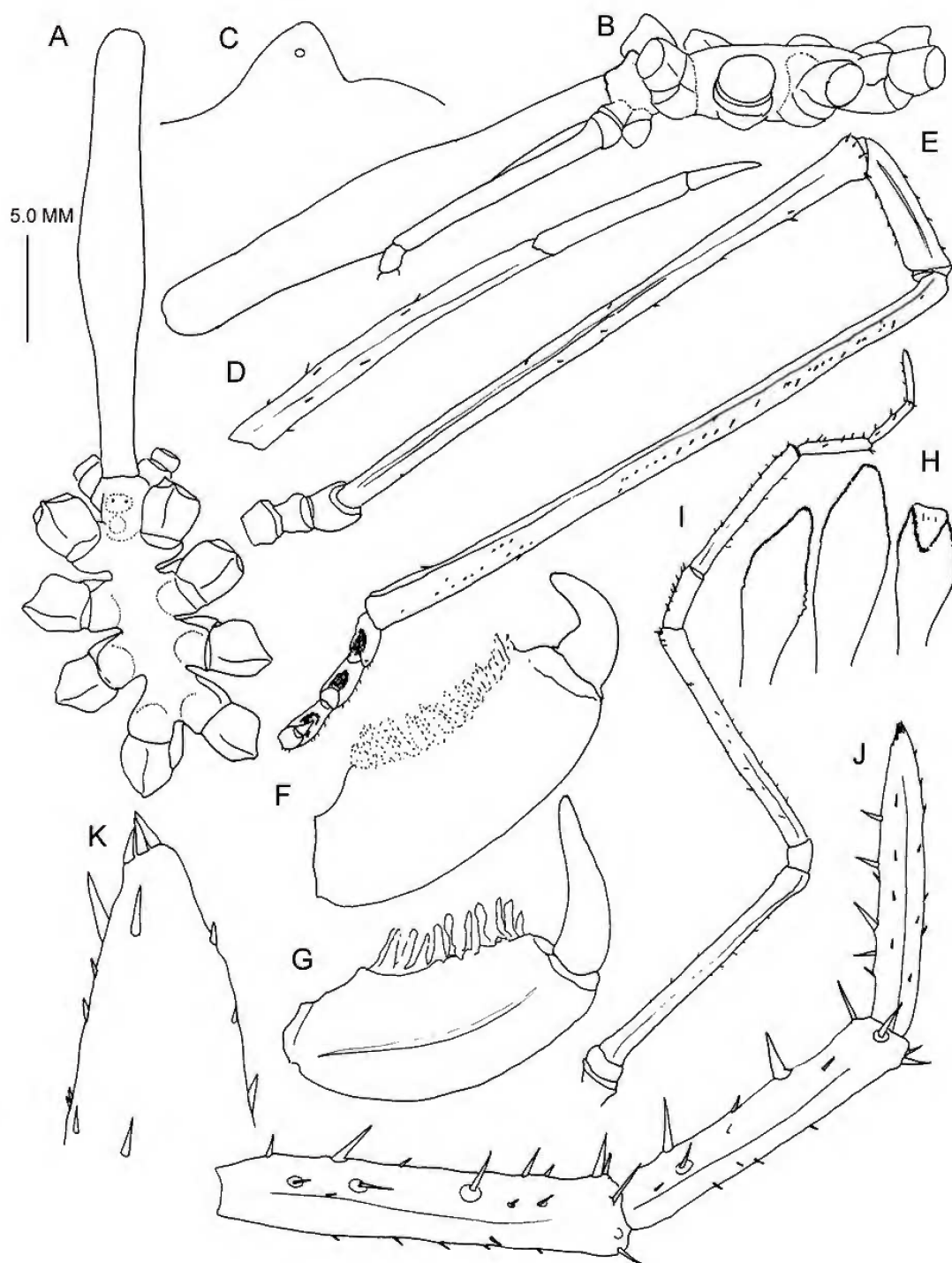


Figure 3. *Colossendeis tasmanica* (J48897): A, B, dorsal and lateral views of trunk; C, ocular tubercle; D, tarsus and propodus; E, oviger; F, oviger segment 10; G, (J40744), juvenile oviger segment 10; H, oviger spines; I, palp; J, palp segments 8–10; K, tip, palp segment 10.

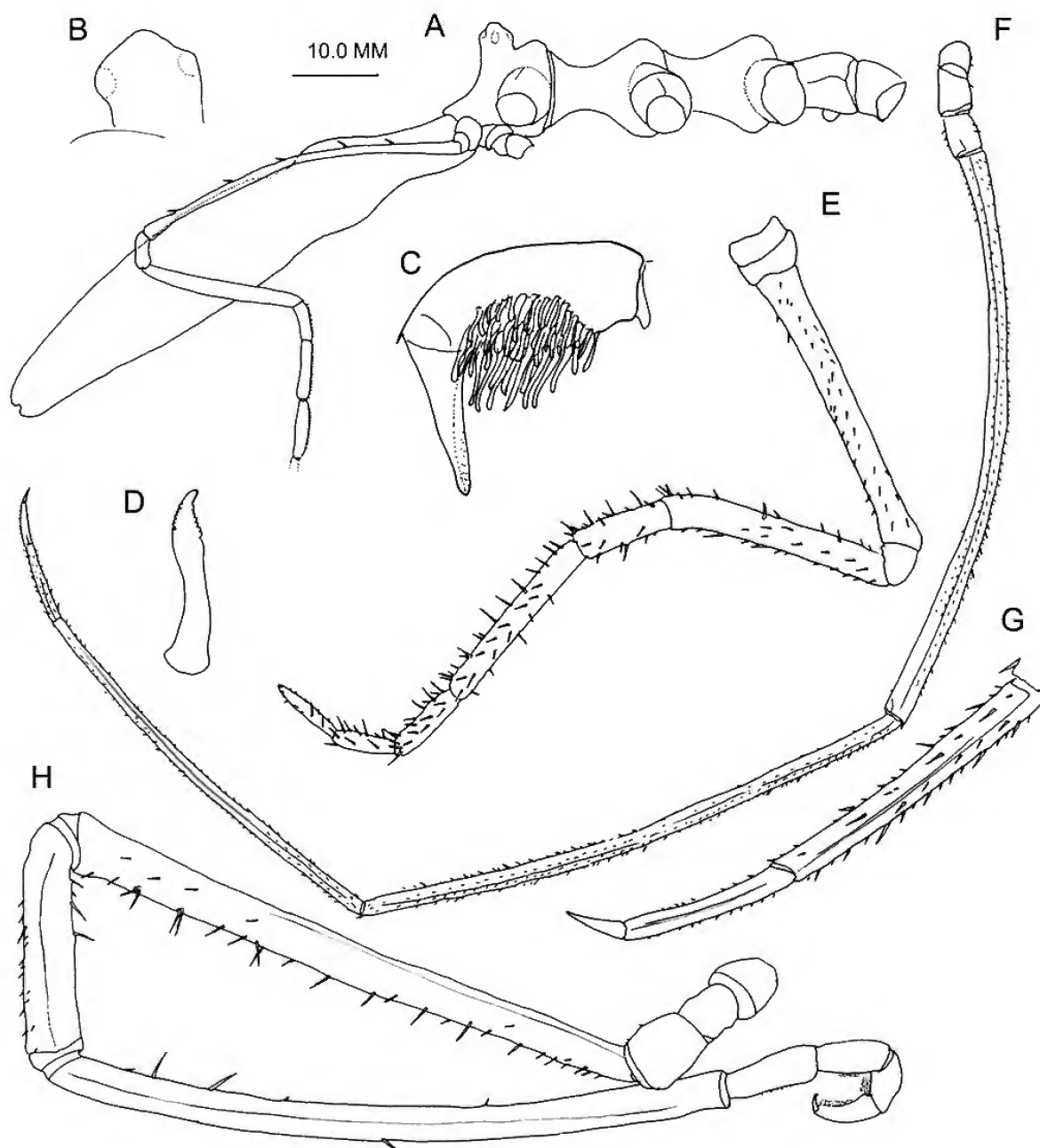


Figure 4. *Hedgpethia dampieri* Child, 1975 (NMV J48903): A, Trunk, lateral view; B, ocular tubercle; C, oviger segment 10; holotype (WAM 70-3953) D, oviger spine. *Colossendeis spicula* (NMV J54504): E, palp; F, leg 2; G, tarsus and propodus; H, oviger.

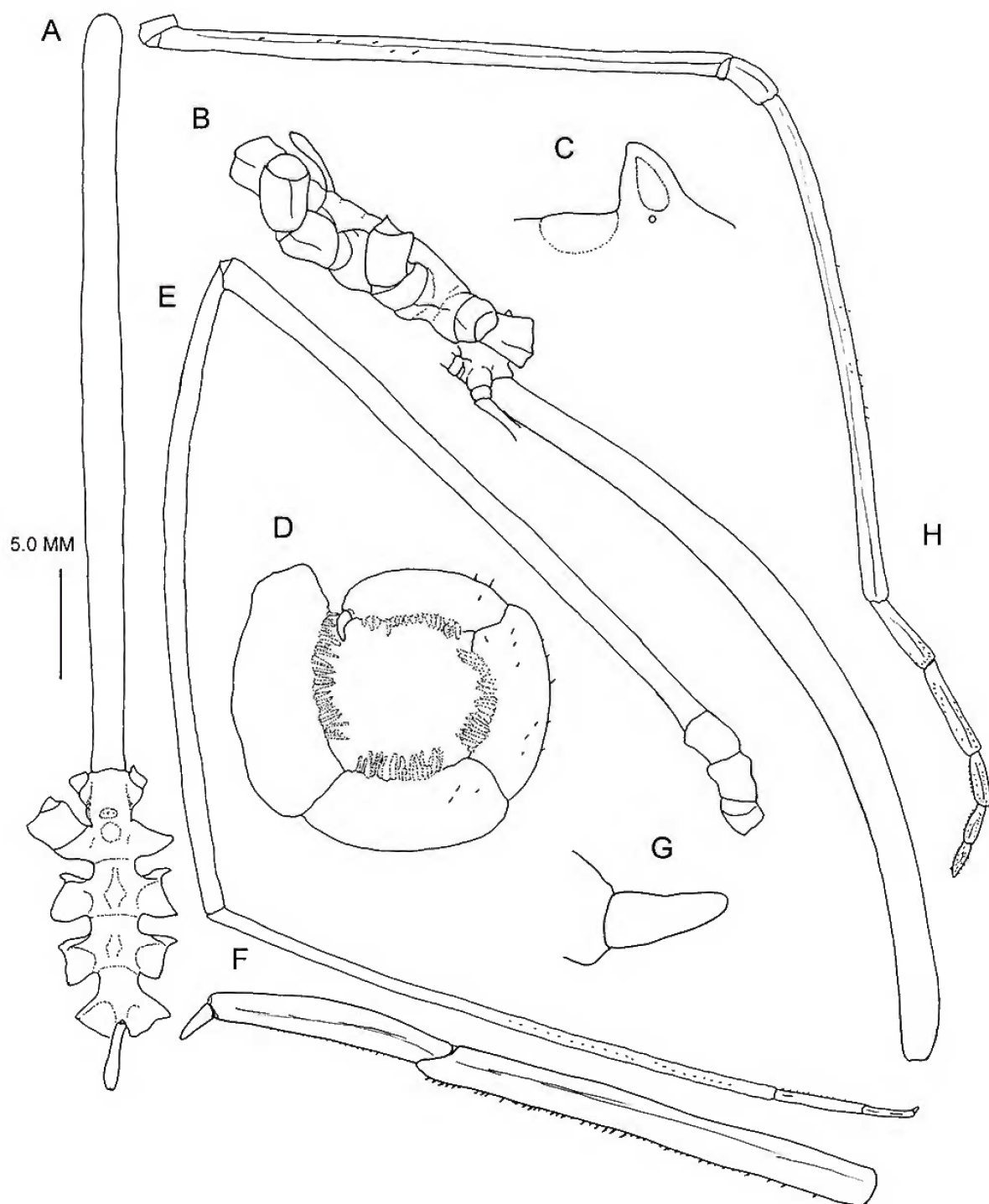


Figure 5. *Colossendeis melancholicus* (NMV J48898): A, B, dorsal and lateral views of trunk; C, ocular tubercle; D, oviger segments 7–10; E, leg 2; F, tarsus and propodus leg 2; G, claw; H, palp.

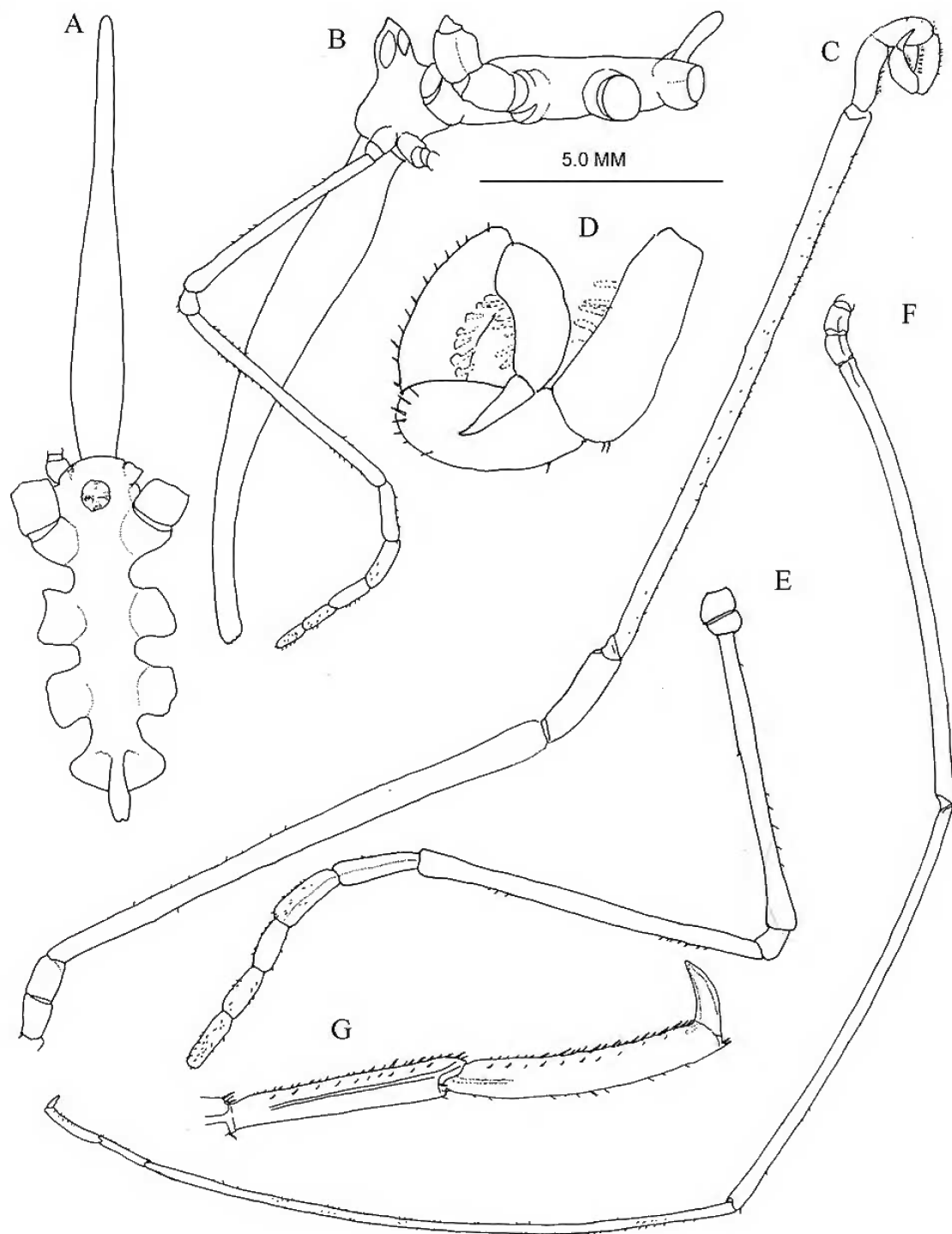


Figure 6. *Colossendeis mycterismos* sp. nov. holotype (NMV J48824): A, B, dorsal and lateral views of trunk; C, ovipiger; D, ovipiger segments 7–10; E, palp; F, leg 3; G, tarsus and propodus.

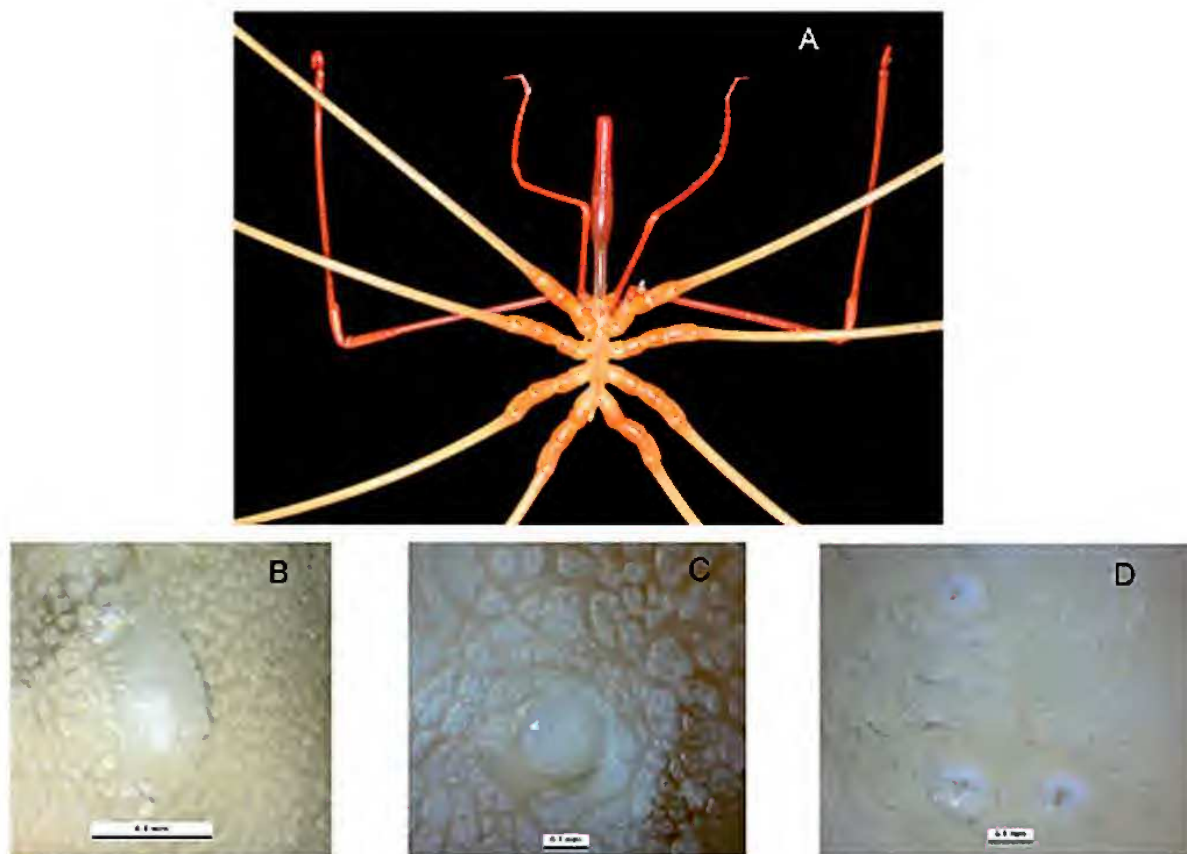


Figure 7. A. *Colossendeis colossea*, dorsal (Photo Gowlett-Holmes, CSIRO) B. *Colossendeis melancholicus*. (J40746), coxal pellicula. (Photo D.A. Staples) C. *Colossendeis arcuata* (SAM E3383) genital pore, leg 3. D. *Colossendeis arcuata* (SAM E3383) sensory setae, oral surface. (Photos D.A. Staples)

Remarks. These specimens agree in all respects with previous observations. Scattered cone-shaped pits each with a single median spine surround the oral surface and presumably serve a sensory function (fig. 7D). The down-curved proboscis of this species resembles *C. rostrata* Turpaeva, 1994 from which it otherwise differs in the proportions of palp segments 3 and 5 and by having the trunk and legs covered in small spines; the slightly taller spines on the leg segments are interspaced by 5–7 shorter spines. The leg span is about 400 mm. Coxal pelliculae are present on all legs. Genital pores (fig. 7C) tiny, round, on distoventral surface of coxa 2 of all legs.

This is the first record for Australian waters, although it has been recorded from nearby New Zealand (Child, 1998).

Colossendeis colossea Wilson, 1881

Figures 2A–J, 7A, Table 1.

Colossendeis colossea Wilson, 1881: 224–246, pl.1, fig. 1, pl. 3, figs 5–7—Fry and Hedgpeth 1969: 53–54 [earlier literature], fig. 8—Stock, 1975: 987; Stock, 1987: 508 (literature)—Bamber and Thurston,

1993: 859; Bamber and Thurston, 1995: 143–144, 147—Child, 1994: 10–11; Child, 1995: 76; Child, 1998: 56–57—Bamber, 1995: 147.

Material examined. Western Australia. 80 km WNW of Green Head, from 29°51.9'S, 114°11.6'E, bottom 770 m, to 29°50.3'S, 114°10.9'E, bottom 760 m, Western Deep-Water trawl, RV *Southern Surveyor*, M. F. Gomon and CSIRO, 7 Feb 1991 (SSO1/1991 stn 62), NMV J40745 (2 specimens). NW Australia, 20°95.01'S, 114°01.58'E to 20°98.82'S, 113°99.38'E, 1018 m, Benthic Dredge, RV *Southern Surveyor*, CSIRO, 9 Jun 2007, (SS05/07 stn 002), NMV J55743 (1 specimen). NORFANZ Lord Howe Rise, 32°03.98'S, 159°52.80'E, 1934 m, Ratcatcher bottom trawl, 24 May 2003, (Tan 0308, stn 071), NMV J48818 (1 specimen). West Norfolk Rise, Wanganella Bank, 35°35.83'S, 169°33.43'E, 1760 m, Ratcatcher bottom trawl, 5 Jun 2003, (Tan 0308, stn 167), NMV J53079 (4 specimens). Lord Howe Plateau, 32°25.94'S 161°47.62'E, 1132 m to 32°25.08'E 161°44.31'S, 1197 m, Ratcatcher bottom trawl, 24 May 2003, (Tan 0308, stn 73), MNZ PY.55 (2 specimens). South Australia. Approx 80 n miles SW of Cape du Covedic, Kangaroo I. from 36°38'S, 137°08.20'E, to 36°30'S, 137°20'E, 1000–1200 m, trawled, FV *Adelaide Pearl*, K.J. Olsson, Aug 1988, SAM E3389 (2 fragmented specimens). Tasmania. E of Piccaninny Point, Tasman Sea, 41°40'S, 148°41'E, 1097 m, amongst orange roughy haul, FV *Pacific Dynasty*, (no date), AM P6111 (1 specimen).

Diagnosis based on specimens in this collection: A large species. Trunk smooth, unsegmented, lateral processes clearly separated. Proboscis straight, bottle-shaped, 1.7–1.9 times length of trunk, 5.8–6.8 times as long as greatest width, basal third narrowest, mid-region swollen, slightly tapering to 1.1–1.4 times basal width at tip. Abdomen articulated, clavate, 13–18% of trunk length. Palp segment 3 longest, segment 10 very slender, length 7.5–9.3 times median width, tapering evenly to rounded tip. Ovipiger claw and segment 10 coalesced; length of segment 10, 4.3–5.2 times distal width and conspicuously tapered to form a continuum with terminal claw.

Expanded description based on specimens in this collection. First lateral processes inclined and the cephalon angled downwards at about 45°. 2nd and 3rd lateral processes separated by one-quarter to one-third basal widths. Post-ocular mound low and lacking the internal tubules found in the surrounding cuticle. Two eyes unpigmented in preserved material. Ocular tubercle variable, either conical or broad in anterior view, with or without small mid-dorsal papilla; lateral sensory organs well-defined. Palp segment 3, 1.1–1.2 times as long as segment 5; segment 7 about twice segment 6, 1.9–2.1 times segment 8; segment 8, 1.1–1.4 times as long as segment 9; segment 10, 1.0–1.4 times length of segment 9, segment 10 with 3 to 4 forward-facing spines, segments 7–9 more spinous than remaining segments. Segment 5 has a single gland on external surface. Ovipiger segment 6 longest, about 1.1 times as long as next longest, segment 4; segment 4 has a single gland opening at about 75% of its length, segments 4–6 with scattered small, simple spines, distal four segments each bearing a dense field of long spines on the raised sole of each segment, spines spatulate, some with faint marginal serrations and obscure crenulation; terminal claw hooked, slightly skewed. Legs about 12 times length of trunk. Femur gently curved, 35–38 times as long as distal width, femur and tibia 1 subequal, tibia 1 about 22% longer than tibia 2, the tarsus is 1.7–2.3 times as long as the propodus and the claw 47–61% of the propodal length. Genital pores are on the proximal surface of a low distoventral transverse ridge on legs 3 and 4; those of some specimens about half the size of larger pores, possibly indicating sexual dimorphism. Coxal pellicula present on the dorsal surface of coxa 2 of all legs.

Distribution. A cosmopolitan deep-sea species. Regional records from Campbell Plateau, SE of Bounty Is; Lord Howe Rise and Raukumara plain, E of North Island New Zealand. East, south and west coasts of Australia. Rarely recorded south of the Antarctic convergence. Depth, 647–5219 m.

Type locality. Eastern coast United States, (Blake stn 307, 41°29.45'N, 65°47.10'W).

Remarks. These specimens ranged in size from 255 to 530 mm and agree in all significant respects with Wilson's description of the holotype. In the light of this material, additional observations of intraspecific variability are noted. The distal 3 palp segments are usually recorded as being subequal, whereas in this material there are consistent but small differences. In the absence of a segmentation line separating the ovipiger claw from segment 10, the length of the segment is measured from the basal margin of the segment, to the distal end of the spine

field and the width of the segment from the outer margin of the segment to the same point at the base of the spines. In life (specimen NMV J55743), the trunk and longer leg segments were generally a straw-colour; the proboscis, palps and ovigers a deep orange-red; the ocular tubercle, coxae and propodi of a lighter shade. The proboscis was almost blood red when the specimen was first retrieved but soon changed to match the palps and ovigers (fig. 7A). In contrast to preserved specimens with unpigmented eyes, the eyes were highly reflective, possibly luminescent. Hedgpeth's (1948: 272) observation of the species being bright orange-scarlet in life may be a generalization or indicate intraspecific colour variation.

Colossendeis tasmanica sp. nov.

Figures 3A–H, Table 1

Material examined. Holotype: Tasmania, E of Furneaux Group from 39°48.27'S, 149°06.02'E 1923 m, to 39°47.06'S, 149°05.19'E, 1962 m, McKenna Market trawl. RV *Southern Surveyor*, CSIRO, 29 Apr 2000 (SS01/00 stn 260), NMV J55741.

Paratypes: Details as for holotype, NMV J55742 (4 specimens).

Other material. New South Wales. 67 km ENE of Nowra, from 34°41.97'S, 151°22.44'E, 1896 m, to 34°42.14'S, 151°21.72'E, 1642 m, 3.5 m beam trawl, RV *Franklin*, G.C.B. Poore et al., 22 Oct 1988 (stn Slope 59), NMV J54503 (3 specimens). Off Nowra, from 34°58.40'S, 151°23.20'E, bottom 1750 m, to 34°56.40'S, 151°29.10'E, bottom 1650 m to 1750 m, trawl, 5 m Otter, RV *Franklin*, M.F. Gomon et al., 16 Jul 1986 (stn Slope 15), NMV J40746 (2 specimen). 100 km ENE Nowra, from 34°34.43'S, 151°40.82'E, 2800 m, to 34°34.45'S, 151°39.89'E, 2700 m, trawl, 3.5 beam, RV *Franklin*, G.C.B. Poore et al., 23 Oct 1988 (stn Slope 60), NMV J40742 (2 specimens). Tasmania. E of Furneaux Group from 39°48.27'S, 149°06.02'E 1923 m, to 39°47.06'S, 149°05.19'E, 1962 m, McKenna Market trawl, RV *Southern Surveyor*, CSIRO, 29 Apr 2000 (SS01/00 stn 260), NMV J48897 (30 specimens). E of Furneaux Group from 39°48.27'S, 149°06.02'E 1923 m, to 39°47.06'S, 149°05.19'E, 1962m, McKenna Market trawl, RV *Southern Surveyor*, CSIRO, 29 Apr 2000 (SS01/00 stn 260), MNZ PY.56 (2 specimens). 41 km NE of Cape Tourville, Freycinet Peninsula, from 41°54.54'S, 148°45.15'E, 1273 m, to 41°42.60'S, 148°42.60'E, 1190 m, trawl, 3.5 beam, RV *Franklin*, G.C.B. Poore et al., 30 Oct 1988, (stn Slope 83), NMV J40743 (1 specimen). Victoria. 85 km E of Point Hicks from 38°31.41'S, 149°21.10'E, 1986 m, to 38°30.58'S, 149°21.50'E 1360 m, 3.5 m beam trawl, RV *Franklin*, G.C.B. Poore et al., 26 Oct 1988, (stn Slope 72) NMV J40744, (18 specimens). 38°30.66'S, 149°22.99'E to 38°30.89'S, 149°21.63'E, 1859 m, Epibenthic sled, RV *Southern Surveyor*, CSIRO, 19 Apr 2000, (SS01/00 stn 172), NMV J48899 (4 specimens).

Diagnosis. A large species. *Colossendeis colosseae*-like. Lateral processes clearly separated. Proboscis bottle-shaped, 1.7–2.0 times length of trunk, straight, median swelling preceded by narrower basal part and tapering distally to terminate in a rounded oral surface. Abdomen articulated, maximum width in distal one-third, length 19–29 % of trunk. Palp segment 3 longest, segment 10, 6.3–7.4 times as long as median width. Ovipiger 10-segmented, terminal claw strongly curved, distinctly articulated with segment 10, segment 10 not tapered distally.

Description of holotype. (Range of variability in brackets). Leg span up to about 550 mm (400–550 mm). 2nd and 3rd lateral processes separated by about one-sixth of basal width (one-sixth

to greater than half). Cephalon directed downwards slightly. Ocular tubercle bluntly conical with apical papilla (bluntly conical or broad in anterior view, mid-dorsal papilla variably developed), 2 well-developed eyes, unpigmented in preserved specimen, lateral sensory organs prominent; post-ocular mound low. Abdomen originating from lateral surface between 4th pair of legs, length 21% (19–29%) of trunk, clavate, anus on dorsodistal surface. Proboscis 2.0 (1.7–2.0) times length of trunk and 6.4 (6.1–6.8) times as long as maximum width (subadults about 7.2 times), straight, median swelling preceded by narrower basal part and tapering distally to terminate in a rounded oral surface, width at tip 1.3 (1.2–1.4) times basal diameter. Ovipiger 10-segmented, terminal ovipiger claw hooked and distinctly articulated with segment 10; proximal and distal widths of segment 10 about equal, length 3.4 (2.5–3.5) times distal width (measured from outer margin to base of spines); strigilis strong, carried somewhat horizontally with claw resting against outer, or lower, side of segment 10; spine fields on segments 7–10 dense, trailing edge spines longer, laid-back, individual spines each with fine marginal serrations, particularly evident in subadults (fig. 3H), scattered, short, simple, spines on longer segments; segment 6 marginally longer than segment 4 (equal to 1.1 times), single gland opening on interior surface of segment 4 at about 75% of length. Palp segment 3, 1.2 times longer than segment 5 (1.0–1.2); segment 7, 2.4 times segment 6 (2.2–2.5); segment 10 narrowing markedly towards tip, slightly irregular distally with a slight to marked constriction, length 7.3 (6.3–7.4) times median width, with 3 to 4, forward-facing spines at the tip (fig. 3K) and 2–4 strong spines on inner and ventral margins, smaller spines all over; spines most abundant on segments 7 and 8; single gland openings on outside surface of segment 5. Leg length 12.2 (9.3–12.2) times trunk, longer segments with scattered, short spines, femur curved, 25–33 times as long as distal width, equal to, or a little longer than tibia 1; tibia 1 about 25% longer than tibia 2, tarsus 1.7–2.8 times propodus; terminal claw 40–72% length of propodus; coxal pelliculae are present on the dorsal surface of coxa 2 of all legs in adult forms, absent or not evident in subadults; genital pores on the proximal surface of a low distoventral transverse ridge on legs 3 and 4.

Measurements of holotype (in mm). Length trunk (frontal margin cephalic segment to tip 4th lateral process), 21.5; width

across 2nd lateral processes, 11.0; length proboscis (lateral) 42.0; greatest width proboscis, 6.6; length abdomen, 4.5. Third leg: coxa 1, 3.1; coxa 2, 5.3; coxa 3, 5.3; femur, 86.0; tibia 1, 86.0; tibia 2, 68.0; tarsus, 5.5; propodus, 3.5; claw, 1.5. Measurement of palp segments (in mm). Seg. 1, 1.3; seg. 2, 0.8; seg. 3, 13.1; seg. 4, 2.1; seg. 5, 16.7; seg. 6, 4.2; seg. 7, 10.1; seg. 8, 4.6; seg. 9, 3.9; seg. 10, 4.1.

Etymology. Referring to the collection locality, the Tasman Sea.

Distribution. East coast of Australia; off the coast of Portugal, 1190–2800 m depth.

Remarks. This species shares much in common with *C. colossea* but constant and conspicuous differences in the articulation of the ovipiger claw, the less tapered ovipiger segment 10, the proportions of the abdomen and the longer, more slender palp segment 10, distinguish the species (Table 1).

Size differences of genital pores were noted between specimens. The smaller pores were about half the size of the larger, but based on this difference alone, specimens could not be assigned to sex with confidence. To some extent, the size of these pores is proportionate to the size of the specimen and in the apparent absence of other dimorphism, sex is uncertain. The abdomen shows slight variability; in some cases more narrowed distally than in others. Leg spans of subadults were in the range of 290–350 mm. The ovipiger claw is straight to slightly curved and palp segment 10 is much shorter than in adults, the length ranging from about 4 times median width. Articulation of the ovipiger claw with segment 10 is constant, but the shape of the claw and the proportions of palp segment 10 are unquestionably correlated with maturity. To enable comparison with *C. colossea*, the length of ovipiger segment 10 is measured from the proximal margin of the segment to the distal edge of the spine field rather than to the point of articulation with the claw. The width of the segment is measured from the outer margin of the segment to the base of the spines. The particularly fine serrations of the ovipiger spines in subadults is perhaps indicative of a lack of wear and the spines are very thin, so much so, that the tip of several spines were folded over (fig. 3H). Although not a constant character, the first lateral processes were less inclined and directed more forward than in *C. colossea*.

Table 1. Primary characters distinguishing *C. colossea* and *C. tasmanica*.

	<i>C. colossea</i>	<i>C. tasmanica</i>
Ovipiger claw	Coalesced	Segmented
Ovipiger segment 10	Tapered distally	Uniform width
Ovipiger segment 10, L/W	4.3–5.2	2.5–3.5
Palp segment 10, L/W	7.5–9.3	6.1–7.8
Palp segment 10, distal	Uniformly rounded	Irregular, narrowed
Abdomen/trunk	13–18% (<20%)	19–29% (>20%)

Colossendeis tasmanica is found sympatric with *C. colossea* in the Tasman Sea although of the 75 specimens documented in this report, the two species were never recorded together from the same collection site. Regional records of *C. tasmanica* are confined to the eastern coastline, whereas *C. colossea* is more widely spread around the Australian continent and elsewhere. Nogueira, (1967) recorded and illustrated what appears to be a juvenile *C. tasmanica* from a similar depth to the Tasman Sea specimens off the coast of Portugal, confirming the probability that records of *C. tasmanica* lie unrecognised amongst collections of *C. colossea*. Regional records of *C. tasmanica* are from a greater depth than those for *C. colossea*. This species also shares a resemblance to *C. curcubita* (Cole, 1909), previously recorded in the region from New Zealand and south of Australia. *Colossendeis cucurbita* can be readily distinguished from *C. tasmanica* by the shape of the terminal oviger claw and the proportions of the palp segments. *Colossendeis cucurbita* is a member of the 'macerrima complex' a group characterized by having palp segment 3 much shorter than 5 and in which the three distal most segments are equal to, or less than, segment 7. Based on Cole's illustration of the holotype (pl. 3, fig. 7), the proboscis is more upturned and wider distally than *C. tasmanica*.

Encapsulated juvenile gastropods were attached to the legs of several specimens of *C. tasmanica* and in one case, to the trunk and proximal palp segments. Most capsules contain a single gastropod and many had been vacated. This apparent phoretic association with the genus *Colossendeis* is common and although not evidenced in this material, may extend to being symbiotic or ectoparasitic (Sirenko, 2000; Lehmann et al. 2006). Two deep-water species of stalked barnacle were recorded primarily on the dorsal surfaces of the trunks and legs of several specimens. *Glyptelasma carinatum* (Hoek, 1883) is a cosmopolitan barnacle species previously recorded from the Challenger Plateau, Tasman Sea and the other species, tentatively placed in *Catherinum* sp. cf. *sinuatum* (Pilsbry, 1907), is a deep-water Atlantic species (J. Buckeridge pers. com.).

Colossendeis spicula Child, 1994

Figure 4E–H

Colossendeis spicula Child, 1994: 14. Fig. 6 (A–B)

Material examined. Victoria. 85 km S of Point Hicks 38°31.41'S, 149°21.10'E, 1986 m, to 38°30.58'S, 149°21.50'E, 1360 m, 3.5 Beam trawl, RV *Franklin*, G.C.B. Poore et al., 26 Oct 1988 (stn SLOPE 72), NMV J54504 (3 specimens).

Diagnosis. Leg span to about 285 mm. Lateral processes shorter than their diameters, fringed distally with a few scattered, short, spines; 2nd and 3rd lateral processes separated by about one-third basal widths, 1st pair not conspicuously raised. Anterior margin of cephalon with pair of small but prominent apophyses over base of palp insertions. Ocular tubercle low, two eyes, unpigmented. Proximal quarter of proboscis narrow, inflated in mid-region, tapering distally to a rounded tip, width marginally less than basal diameter. Palps conspicuously spiny, segment 3, 1.4 times segment 5; segment 7 greater than twice length of segment 6. Abdomen articulated, clavate, little less than 30% of

trunk length. Oviger 10-segmented, terminal claw gently curved and articulated with segment 10. Legs about 9 times length of trunk; femur marginally longer than tibia 1; tibia 1, 1.3 times tibia 2. Tarsus 1.8 times propodus, claw 36% of propodus. Spines in rows, straight or curved slightly, longer spines equal to, or longer than width of segment.

Distribution. West and east Pacific (Tasman Sea and off the Oregon coast), Depth 1360–2832 m.

Type locality. Off the Oregon coast, USA.

Remarks. This collection consists of one large and two smaller specimens about half the size of the larger specimen. Although having fewer spines, they are presumed to be sub-adults of this species. The ocular tubercles of the smaller specimens terminate in an apical cone which was not present in the larger form. The larger specimen is of the same size as the holotype and agrees in almost all respects with Child's description. Differences are principally confined to spination of oviger segments 4–6 which carry numerous long, sharp, simple spines not present on the holotype. Another minor difference is found in the proportions of the femur and tibia 2. Internal ganglia and smooth cuticle in the area where two eyes are usually positioned, suggests that the apparent absence of eyes in the holotype may be a legacy of preservation. Well-defined lateral sensory organs were present on the dorsolateral surface of the ocular tubercle. Palp and oviger gland openings are not evident. Child (1994, fig. 4A) clearly figures a 10-segmented palp; however his description overlooks the small 1st segment. His reference to the 2nd palp segment being longest should in fact be the 3rd segment; the 4th segment should be the 5th and so on. Spines on all longer segments are straight and often longer than the corresponding segment. Child describes the three distal segments as being progressively shorter but in this specimen the 10th segment is 1.2 times longer than the 9th, otherwise all segments agree with the holotype in their proportions. Coxal pellicula and genital pores are not evident in this material.

Numerous gastropod egg capsules were attached to the dorsal surface of the trunk of the larger specimen and ventral surface of one or more legs of all specimens. Most of these capsules were vacated. This species has also much in common with *C. ensifer* Child, 1995 but that species is distinguished by the presence of strong, hooked spines on the palps and on the longer leg segments.

Colossendeis melancholicus Stock, 1975

Figures 5A–H, 7B

Colossendeis melancholicus Stock, 1975: 988–990, figs 11c–f, 12.—Child, 1994:14 [synonymy]

Material examined. Tasmania. NW flank of St Helens Hill, 41°14.7'S, 148°46.1'E, 1755 m, Benthic dredge. RV *Southern Surveyor*, CSIRO, 27 Jul 1999, (cruise SS03/99, stn 62), NMV J48898 (1 female).

Diagnosis. A large, glabrous species with a leg span to about 450 mm. Proboscis tubular, extremely long and down-curved, diameter almost uniform throughout the length; 13–14 times as long as wide and close to 3 times length of the trunk. Anterior

margin of cephalon with 2 small apophyses. Ovipiger claw short, strongly curved. Palp segments 3 and 5 of about equal length, two large, unpigmented teardrop-shaped eyes, lateral sensory organs present. Abdomen arched, reaching beyond coxa 1 of leg 4. Tarsal spines irregular in size, several smaller spines interspaced by a single larger spine. Palp segment 10, 6.3–7.4 times as long as median width.

Distribution. Florida Straits, Caribbean region and the Tasman Sea, off Tasmania. 732 m to 1755 m depth.

Type locality. Grand Bahama: (27°57'N, 78°56'W–27°55'N 78°59'W).

Remarks. The extraordinarily long, down-curved proboscis of this species sets it apart from any other species of *Colossendeis*. Child's (1994:14) observation of inconsistencies between Stock's (1975) figures and his measurements are more general than he noted. Stock's measurements indicate the proboscis length of the holotype is a little more than twice the trunk length and almost 20 times the maximum width. However, based on his fig. 11d,c, the length of the proboscis is closer to 14 times its maximum width and 3 times the trunk length; the same proportions as found in the Tasman Sea specimen. The main claw of all legs is blunt and the terminal claw of the ovipiger is much reduced and more strongly curved than figured by Stock (figs 11f, 12e). Ovipiger segment 6 is longest, gently curved, and a little longer than segment 4. In agreement with the holotype, tiny genital pores are present on the ventral surface of the 2nd coxae of all legs. Propodal sole spines are worn to flat stubs. Faint suture lines separate the trunk segments. The coxal pelliculae are pale and have the appearance of a collapsed blister (fig. 7B). This record represents a significant extension in geographic and bathymetric range for this rarely recorded species.

Colossendeis cf mycterismos Bamber, 2004.

Figure 6A–G

Colossendeis mycterismos Bamber, 2004:7–9. Fig. 3 (A–E)

Material examined. NORFANZ Stations. Holotype: Lord Howe Plateau, 34°12.20'S, 162°41.44'E, 751 m, 26 May 2003, (Tan 0308, stn 084), NMV J48824 (1 specimen).

Paratype: West Norfolk Ridge, Wanganella Bank, (34°37.20'S, 168°57.03'E), 521 m, 3 Jun 2003, (Tan 0308, stn 154), NMV J53080 (1 specimen).

Diagnosis. A fine, delicate species. Leg span to about 55 mm. Proboscis almost 1.5 times length of trunk, greatest diameter in proximal 3rd, down-curved throughout length, strongly tapered distally. Ocular tubercle with apical point, 2 or 4 eyes, pigmented or unpigmented. Legs slender, terminal claw of all legs short, less than one-third propodus; tarsus, shorter than propodus, propodus ratio variable.

Distribution. East coast of Taiwan; Lord Howe Plateau, Tasman Sea.

Remarks. This material enables additional observations to complement the original description. The proboscis is gently down-curved through its length but more so in distal one-third and articulates from about horizontal, downwards, to what

appears to be a more natural position of about 45°. Palp segment 5 is longest, about 1.2 times longer than segment 3, segment 6, 1.1–1.2 times longer than segment 7 and segments 8, 9 and 10 progressively increase in length. The distal four palp segments were covered in numerous spinules of uniform size; segment 10 is about 4 times as long as wide. The terminal ovipiger claw is straight, smooth and a little longer than half the length of segment 10, finely crenulate spines on segments 7 to 10 are in single row, and number 7:6:6:9. The length of the tarsus relative to the length of the propodus decreased from the 1st pair of legs to the 4th pair in 1 specimen, but in no particular order in the other; the length of the tarsus ranged from 48–97% of the propodus length, the main claw ranged from 27–46% of propodus length. The longer leg segments are gently curved, tibia 1 is equal to, or marginally longer than the femur and tibia 2 is 24–35% longer than tibia 1. The tarsus and propodus have a row of short spines along ventral margin; all segments are covered in short spines, the larger spines interspaced among more numerous shorter spines. Coxal pelliculae were not evident. The ocular tubercle is slightly taller than its basal width, with a variably developed apical point. The four darkly pigmented eyes are of equal size and have convex lenses. Lateral sensory organs were not evident. The genital pores are tiny and placed on the distoventral surface of coxa 2 of all legs. The abdomen is fusiform, curved with a convex dorsal surface and distinctly clavate distally. Differences between the holotype and the Tasman Sea specimens can be summarized as follows. The holotype is about one-third larger than the Tasman Sea specimens and has only one pair of unpigmented eyes; palp segments 3 and 5 are of equal length and segments 6 to 10 are subequal. The femur of the 3rd leg of the holotype is almost 30% shorter than tibia 1, and tibia 2 is only 10% longer than tibia 1. The proboscides of the Tasman Sea specimens are uniformly inflated proximally with a tapered, curved distal region; Bamber's figures (3A, B) show a distinct bulge at one-third the proboscis length and minimal distal curvature. The holotype abdomen was not described, but based on the same figures, it is of uniform width and somewhat convex dorsally. The ovipiger claw is nearly half the length of the 10th segment and has a 'flattened expansion' along its ventral margin (fig. 3C). The number of ovipiger spines in the holotype was not documented for comparison. Ovipiger and palp glands are not evident.

The status of these specimens will have to be reassessed on examination of additional material, particularly as both the holotype and these specimens are recorded from similar depths and are adult, decreasing the chances of differences being attributed to heterogonic growth. Characters of particular significance are the unique variability in the number of eyes from 2 to 4; the differences in the proportions of longer leg segments and differences in the supposed characteristic shape and orientation of the proboscis for which the species was named. Should the proboscis orientation and shape of the *C. mycterismos* holotype prove to be an artefact of preservation, then apart from differences noted above, differences are relatively minor. Rather than introduce another species into a genus already bedevilled by species complexes, I have provisionally referred the specimens to *C. mycterismos*. The specimen from stn 154 was enveloped in a clear, diatom-embedded slime.

Additional measurements and illustrations are provided for future comparison.

Measurements (in mm). Length trunk (frontal margin cephalic segment to tip 4th lateral process) 2.64; width across 2nd lateral processes 0.88; length proboscis (lateral) 3.25; greatest width proboscis 0.50; length abdomen 0.43. Third leg: coxa 1, 0.38; coxa 2, 0.48; coxa 3, 0.38; femur 7.43; tibia 1, 7.43; tibia 2, 9.80; tarsus 0.80; propodus 0.98; claw 0.28.

Oviger; seg. 1, 0.10; seg. 2, 0.25; seg. 3, 0.27; seg. 4, 2.27; seg. 5, 0.62; seg. 6, 3.60; seg. 7, 0.44; seg. 8, 0.35; seg. 9, 0.25; seg. 10, 0.25; claw, 0.16. Palp segments (in mm). seg. 1, 0.02; seg. 2, 0.09; seg. 3, 1.78; seg. 4, 0.18; seg. 5, 2.10; seg. 6, 0.50; seg. 7, 0.44; seg. 8, 0.31; seg. 9, 0.34; seg. 10, 0.40.

Two other species share a similar proboscis shape with *C. mycterismos*; *Colossendeis pipetta* Stock, 1991 and *C. sinuosa* Stock, 1997. As noted by Bamber, the tarsus in both species is longer than the propodus and the proboscides are more tubular distally in both species. *Colossendeis pipetta* can further be distinguished by the higher numbers of spines on oviger segments 7 to 10. Stock described the lateral processes of this species as being separated by twice their own diameter; however his fig. 28B shows them to be separated by about their own diameter. Also, his reference to oviger segments 3 and 5 should be to segments 4 and 6. Stock's brief description of *C. sinuosa* does not enable adequate comparison with that species and his relative descriptions of the palps as being "less elongate" and of "different slenderness", necessitates re-examination of the type material. In the meantime, *C. pipetta* can be primarily characterised by the 'sinuous' shape of the distal portion of the proboscis.

Hedgpethia Turpaeva, 1973

Colossendeis.— Loman, 1908: 22–23

Rhopalorhynchus.— Stock, 1958:116 (part).

Hedgpethia Turpaeva, 1973: 184–185

Type species. *Colossendeis articulata* Loman, 1908

Diagnosis. Trunk clearly segmented, posterior margin of first three segments swollen or flared. Abdomen short, directed somewhat ventrally, sometimes not visible in dorsal aspect. Ocular tubercle prominent, sometimes acutely conical, eyes rarely absent, often large with convex lenses. Proboscis with inflated mid-region, tapering distally, inflated for most of its length, extent of distal taper variable. 4 pairs of legs. Large propodal heel spines absent. Genital pores are on legs 3 and 4, the female genital pores being much larger than those of male.

Hedgpethia dampieri (Child, 1975).

Figure 4A–D

Rhopalorhynchus dampieri.— Child, 1975: 8–10, fig. a–h

Hedgpethia dampieri Turpaeva, 1973: 185

Material examined. South Australia. Great Australian Bight, 31°50.0'S, 130°45.0'E, 55 m, *RV Southern Surveyor* CSIRO, 13 May 2000, (SS01/00 stn 378), NMV J48903 (1 specimen). Holotype: Western Australia. W of Lancelin I., beam trawl, with bryozoans, 113–122 m, 5 Feb 1964, CSIRO stn 46, WAM 70–3953 (1 male).

Paratypes: Western Australia. W of Mandurah, 110 m, 23 Nov 1970, R.V. *Diamantina*, stn. 4. USNM 149237, WAM 71–1789 (1 female). SW of Jurien Bay, 110 m, 9 Dec 1970, R.V. *Diamantina*, stn 108, WAM 71–1791 (1 female).

Diagnosis. A slender species with leg span to about 40 mm. Lateral processes 1, 2 and 3 separated by about twice basal diameter. Ocular tubercle short, eyes bulging. Proboscis slightly down-curved with short basal part, followed by a similarly short inflated part that narrows to a longer, tapered distal part, rounded at the tip. Abdomen almost hidden in dorsal view. Small genital pores present ventrally on 2nd coxa of legs 2–4.

Distribution. S and SW Australia. 110–122 m depth.

Type locality. W of Lancelin I. Western Australia.

Remarks. This specimen is in good agreement with Child's (1975) description. Re-examination of the type material enables a few additional comments. Small genital pores are present on coxa 2 of the female paratypes but are not evident on the smaller holotype which Child determined to be a male. The ventrally placed abdomen is articulated at its base. Segment 10 of the dissected holotype oviger appears to be lost and segments 5–10 of the remaining oviger are missing. The terminal oviger claw of the South Australian specimen is smooth, with a fine, broad knife edge (fig. 4C) and lacks the two tiny teeth of the holotype.

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